



Integrating Sewer Infrastructure Management and Vacant Land Management in Legacy Cities

Green Infrastructure Conference

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Presentation Outline

- Challenges in Legacy Cities
- Saginaw Green Zone Case Study
- Using Modeling in Integrated Decision Making
- Next Steps

History: Legacy Cities

Outmigration

- Suburbanization mid- to late-20th century
- Poorest residents less mobile

Blight

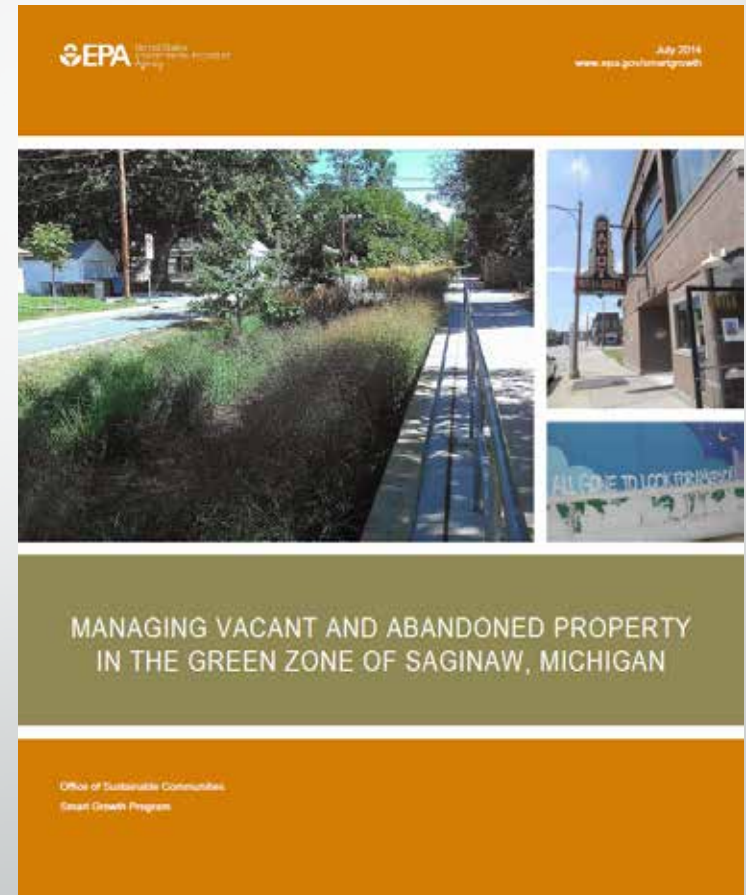
- High urban unemployment and poverty rates
- Foreclosure, abandonment, and dilapidation

Infrastructure & Vacancy

- Expensive, high-capacity infrastructure for now sparse populations
- Hazardous 20-60% urban residential vacancy

Saginaw Green Zone

- City of Saginaw, MI, has lost 50% of its population over the past 40 years, and 25% of its land is vacant.
- Saginaw Green Zone (350 acres with highest concentration of vacancy) was designated as Green Reserve Area.
- Worked with EPA Smart Growth to identify strategies to stabilize neighborhood and envision a new economic future.





Source: EPA

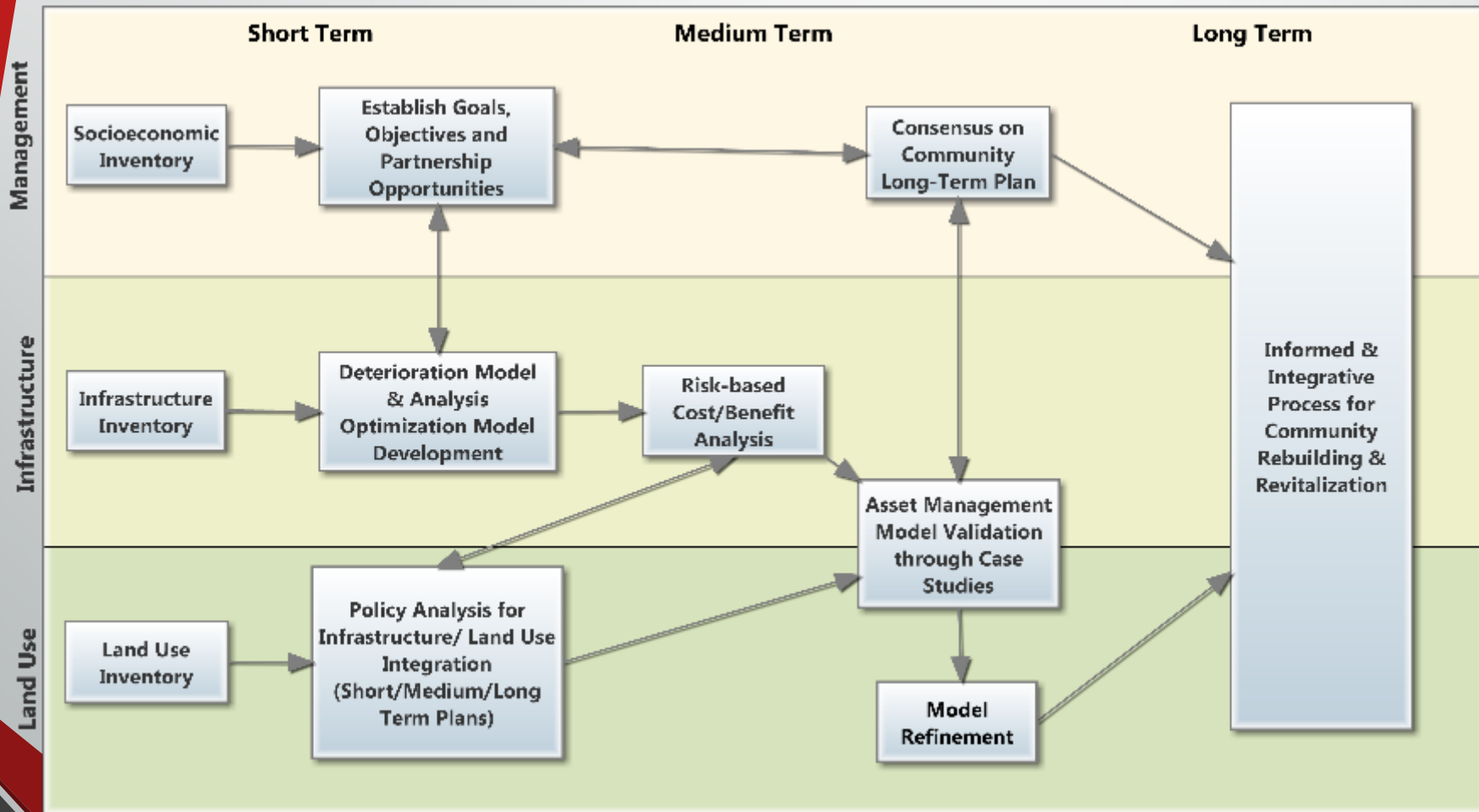


Source: EPA



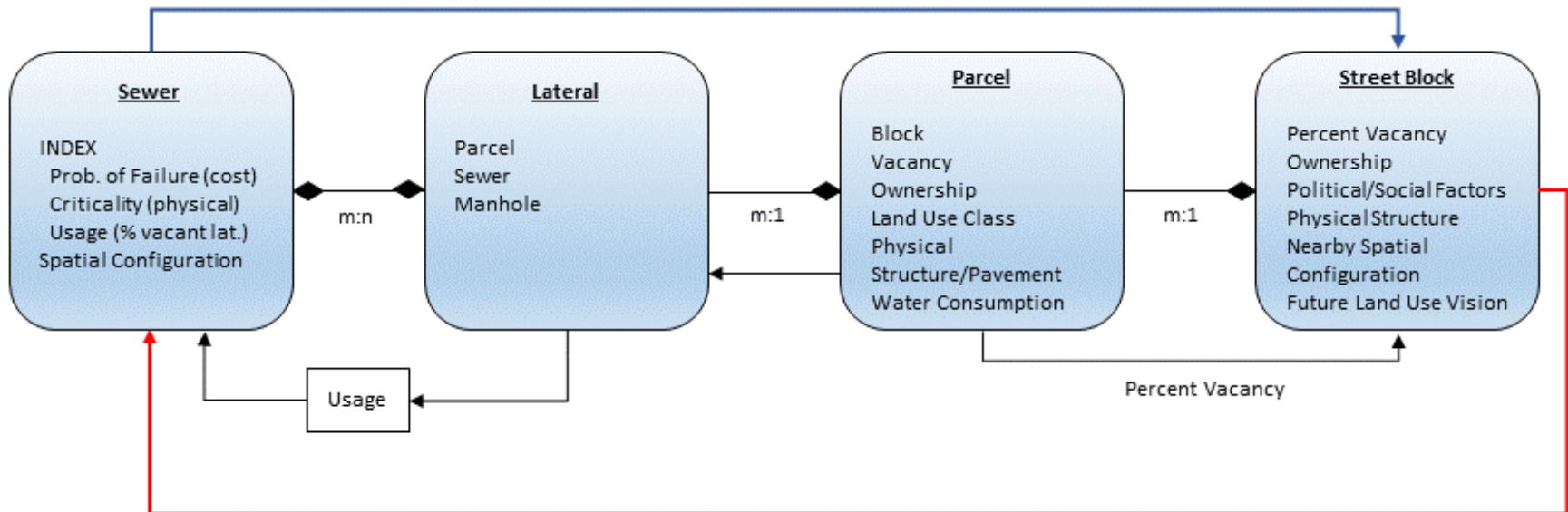
Source: SRA International

Integrated Infrastructure & Land Use Approach



Variable Matrix

(1) Sewer Index



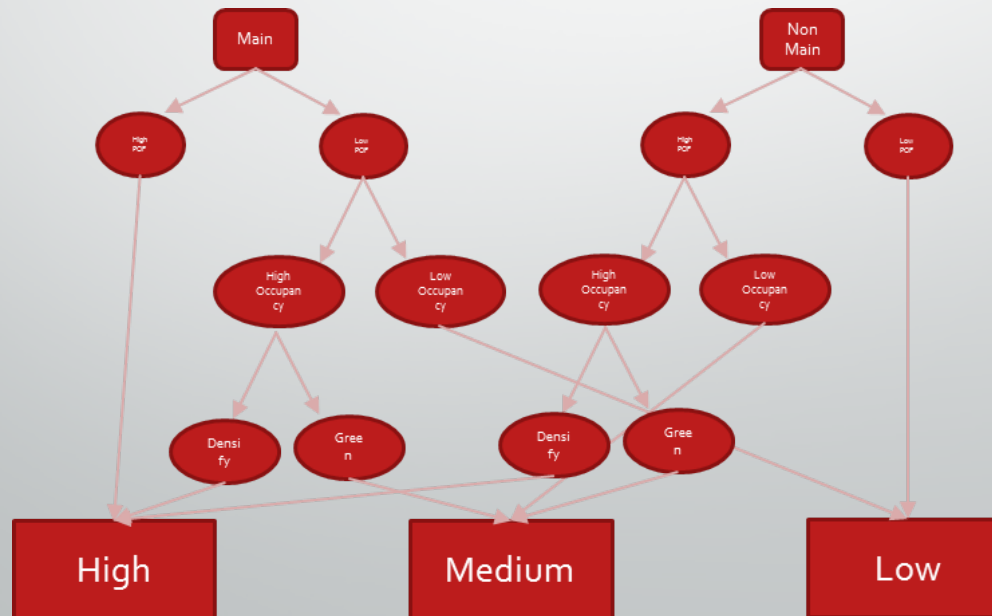
(2) The sewer index is adjusted based on the land use decisions.

Method 1: Develop a Scoring System

Criteria				
Occupancy	<25%	25-49%	50-74%	75-100%
score:	0-24	25-49	50-74	75-100
Private Ownership	<25%	25-49%	50-74%	75-100%
score:	0-24	25-49	50-74	75-100
Sewer Size	S<=12"	12"<S<=24"	24"<S<=36"	36"<S
score:	25	50	75	100
Consumption	0<=F<=1	F>1		
score:	(F^3)*100	100		
Street Class	Off Road	6-7	4-5	1-3
score:	0	10-20	30-60	80-100

$$\text{Criticality Score} = \alpha \text{Occupancy} + \beta \text{Ownership} + \sigma \text{Sewer Size} + \delta \text{Consumption} + \tau \text{Street Class}$$

Method 2: Create a Decision Tree

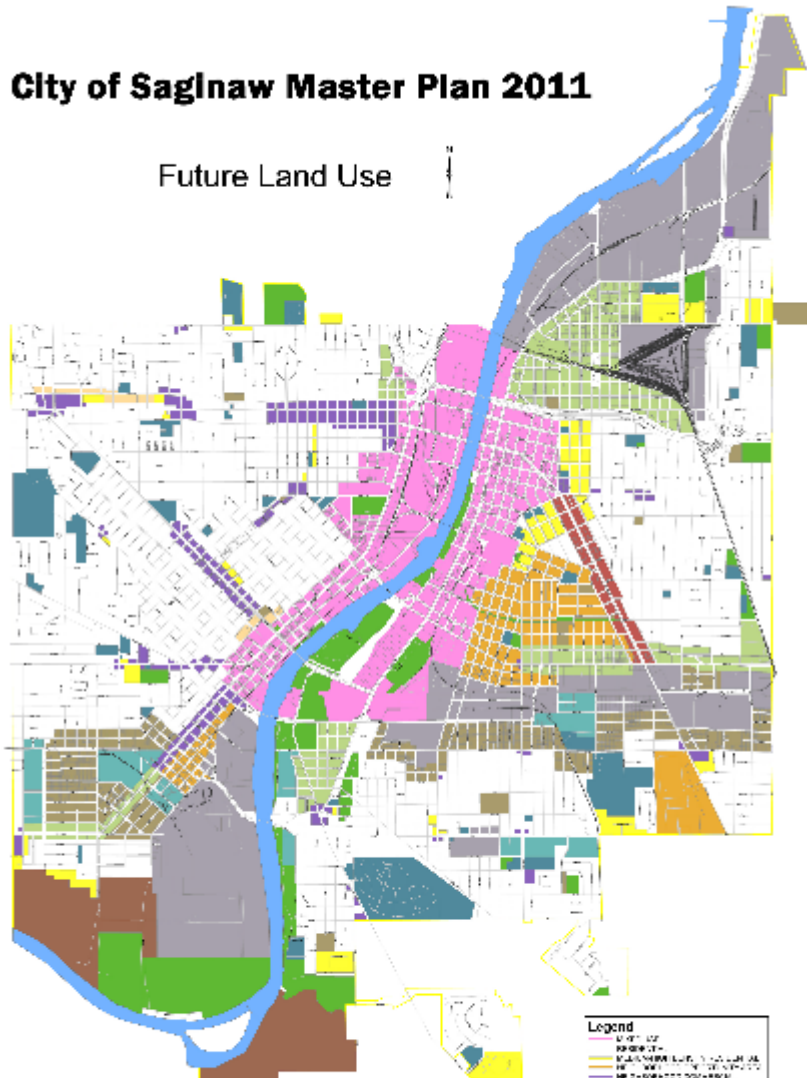


Traditional Infrastructure Decision Making



City of Saginaw Master Plan 2011

Future Land Use





The City of Saginaw Master Plan 2011 is a comprehensive plan for the City of Saginaw, Michigan. It provides a vision for the future of the city and outlines the policies and programs needed to achieve that vision. The plan covers a wide range of issues, including land use, transportation, housing, and economic development. It is a key document for the city's long-term planning and development.

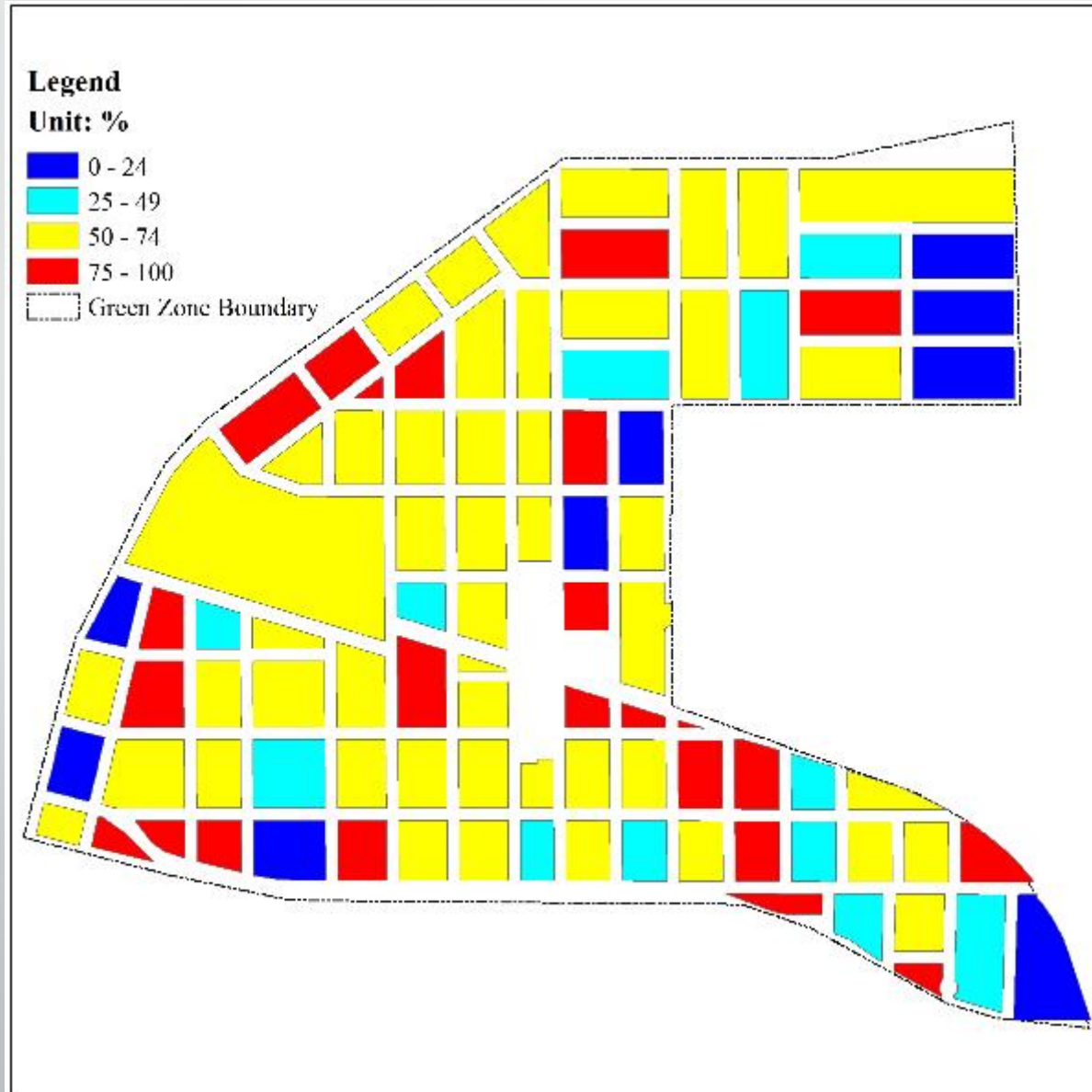
Legend

Green Reserve Opportunity Area	Green Reserve Opportunity Area
Mixed Use	Mixed Use
Medium-High Density Residential	Medium-High Density Residential
Urban Venture Area	Urban Venture Area
Public/Quasi-Public	Public/Quasi-Public

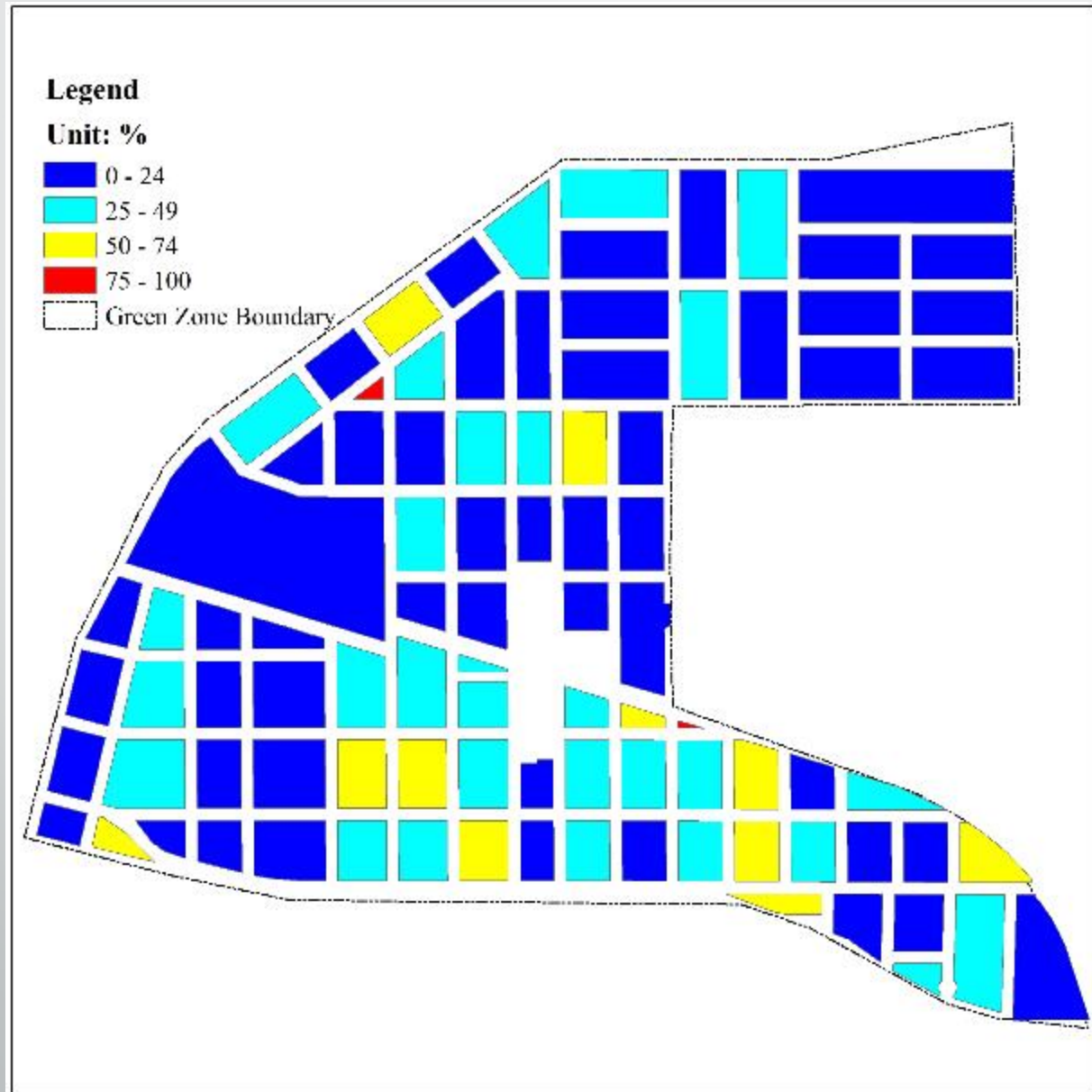


-  Green Reserve Opportunity Area
-  Mixed Use
-  Medium-High Density Residential
-  Urban Venture Area
-  Public/Quasi-Public

Land Use: Vacancy Rates



Land Use: Ownership Rates



Integrated Asset Management Decision Making



Integrated Sewer and Land Use Decision Making Options

Score	Description	Infrastructure Options	Land Use Options
High	These segments are critical components of the sewer system, serving many residents, and exhibiting a high risk. They are a high priority for upgrading and maintenance.	Invest in new, more efficient infrastructure.	Target density and redevelopment in these areas.
Medium	These segments are less critical components of the sewer system, serving fewer residents, and exhibiting a medium risk. They are a medium priority for upgrading and maintenance.	Provide incentives for resident relocation or alternative sewage treatment systems (e.g. community septic).	Utilize temporary green reuse or re-naturalize into green open spaces.
Low	These segments are not critical components of the sewer system, serving no/very few residents, and exhibiting a low risk due to failure. They are a low priority for upgrading and maintenance.	Planned disrepair or shut down of sewer sections.	Target long-term green reuse for community parks, open space, gardens, urban agriculture or renewable energy production.

Conclusions

- Unique opportunity to couple decision making strategies at municipal level to address infrastructure and land use challenges.
- Federal and state programs that support integrated asset management could lead to cost savings and more efficient government.
- Implications for growing cities as well.



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